



AIR BLOWER FOR EXTINGUISHING FIRES AND METHOD FOR EXTINGUISHING FIRES

BACKGROUND OF THE INVENTION - FIELD OF THE INVENTION

A device for extinguishing fires and a method of extinguishing fires.

BACKGROUND OF THE INVENTION - DESCRIPTION OF THE PRIOR ART

Every year, wild fires burn across the United States. Vast areas of forest land in the American mid-west such as Montana, Idaho and Wyoming burn every year. These fires are started by campers being careless with camp fires and lightning. The wild fires often spread quickly and threaten towns, homes and property.

In the year 2000 alone, 27,000 fire fighters combated 73,000 separate fires. These fires claimed over 6.3 million acres. The cost of fighting these wild fires is estimated to be 1 billion dollars. The total economic loss from fires, including property damages and loss of businesses, is estimated to be 10 billion dollars. More importantly, every year, many fire- fighters lose their lives combating the blazes.

Many types of equipment are used to combat wild fires. An effective tool is the use of airplanes to drop fire retardant chemicals and water on the affected area. Water is used to extinguish the blaze, whereas fire retardant chemicals are used to stop the advancement of the fire. Regardless of the advancement in firefighting equipment, the most work is done by fire- fighters on the ground.

Firefighters combat the blaze by extinguishing the fire directly or starting a [back fire] backfire. A [back fire] backfire is the controlled burn of forest in advance of the forest fire. By burning the land, a fire line is created. When the forest fire advances to the area burnt by the [back fire] backfire, it can no longer advance for lack of fuel. Once a fire line is created by a [back fire] backfire, the main blaze is allowed to burn itself out. This method is effective because the firefighters do not have to come in close proximity to the wild fire. However, [back fires] backfires must be properly executed or they will become as great a problem as the original fire. It is important that the [back fire] backfire advance in a direction toward the main forest fire. A sudden shift in winds can prevent the proper advancement of a [back fire] backfire.

Firefighters on the ground use tools such as chain saws to create proper conditions for starting a [back fire] backfire. Trees and heavy brush are cut and set ablaze when the conditions are optimal to cause a [back fire] backfire to advance in a direction toward the main fire.

The prior art discloses several different types of apparatus using the exhaust of an engine to combat a fire. One such example is disclosed in U.S. Patent 4,614,237 (*Colodner et al.*). *Colodner et al.* discloses a combination fire extinguisher and blower. An internal combustion engine powers the blower and includes a hose coupled to the exhaust pipe cover and the air inlet of the blower. The hose pipe exhausts gas into the blower when such gas is needed to extinguish a fire. A second hose is provided on the blower having one end secured to a sleeve fastened to an air cooled nozzle and is used to blow air or exhaust gas, whenever needed.

U.S. Patent 5,848,652, issued to *Bennett*, discloses a fire suppression system for an engine compartment of a vehicle. A remotely controlled throttle valve disposed within the exhaust duct of the engine selectively diverts exhaust gas through a bypass duct for mixing with ventilation air flow. By mixing the gases and the air flow, the oxygen content is reduced in the air flow over the engine. The reduced oxygen content will inhibit combustion.

Another prior art device is disclosed in U.S. Patent 5,154,238, issued to *Buchan*. *Buchan* discloses a fire protection apparatus having spray nozzles oriented adjacent engines of an airplane. Quick connect coupling secure a conduit to the spray nozzles and deliver a fire extinguishing agent such as carbon dioxide directly to the engine to extinguish a fire.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a firefighting tool that can be used for both extinguishing fires and starting [back fires] backfires.

It is another object of the invention to provide a firefighting tool that can be carried on the firefighter's back to leave the hands free for other tasks.

It is yet another object of the invention to provide a lightweight inexpensive but effective firefighting tool.

It is another object of the invention to provide a method for extinguishing fires including operating a blower having an engine and an output hose creating an output of air through the output hose to form an airstream, diverting exhaust from the engine into said airstream and directing the airstream at the fire.

It is still another object of the invention to provide a method for starting [back fires] backfires including operating a blower, the blower having an engine and an output hose, creating an output of air through the output hose to form an airstream, starting a [back fire] backfire, and using the airstream of the blower to promote the spread of the backfire and direct the advancement of the [back fire] backfire.

It is another object of the invention to provide a device for extinguishing fires or starting [back fires] backfires having an engine to create an air flow, an output hose to direct the air flow and a valve for selectively adding exhaust from the engine to the air flow.

It is yet another object of the invention to provide a diverter valve within a Y-shaped valve of a blower, the valve acts to direct the exhaust of the blower to the output hose of the blower or to an exhaust outlet.

These and other objects of the invention will be apparent to one of ordinary skill in the art after reading the description of the invention that follows.

The invention resembles a blower used by commercial landscapers. The device has an engine mounted on a frame. Shoulder straps attached to the frame allow the user to wear the device on his back. This leaves the hands free to operate the blower or other tools such as a chain saw or perform other tasks. Also, wearing the device on the back makes it easier to transport the device over long distances to the source of the fire or [back fire] backfire to be started.

The device generates a stream of air at high speeds. This stream of air can be used to blow out a fire when the air is directed at the source of the fire. When used to extinguish a fire,

exhaust from the engine is diverted through a Y-shaped valve into the airstream. This has a twofold affect as it increases the speed of the airstream and increases the amount of carbon monoxide and carbon dioxide in the airstream to starve the fire of oxygen.

The device can also be used to start [back fires] backfires. After the appropriate location of a [back fire] backfire has been selected, a fire is started. The airstream created by the device can be used to both encourage the propagation of the fire and direct the fire towards the main wild fire. The ability to quickly spread the [back fire] backfire in the proper direction is imperative because a sudden change in wind direction or other weather conditions could cause the [back fire] backfire to become as big a problem as the original fire.

In one aspect of this invention there is provided a method of [extinguishing a fire.

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The method comprises the steps of operating a blower, said blower] controlling a fire, comprising the steps of providing an engine having an engine [and an output hose, creating an output of air from the engine to form an air stream, diverting exhaust from said engine into said air stream, and directing said air stream with the output hose at the fire] exhaust; providing a blower, with an output port, connected to the engine; driving the blower by the engine to provide an output stream of air through the output port; removing at least part of the air stream from the blower; and directing the blower air stream to the fire by means of the output port.

In another aspect of this invention there is provided a method of [starting back fires.

The method] providing a controlled or backfire, comprising the steps of starting a fire[, operating a device to create an air stream, directing said air stream at said] ; providing a device capable of

producing an air stream; producing the air stream by means of the device; directing the air stream at the fire, and causing the fire to spread in a controlled manner.

In [still] yet another aspect of this invention there is provided a [for diverting exhaust. The pipe comprises an exhaust inlet, an exhaust outlet, and an exhaust bypass.] valve. The valve includes an input port and at least two output ports. There is also provided [a valve within the pipe for diverting the exhaust into either the exhaust outlet or exhaust bypass.

In yet another embodiment] a planar valve member for selectively diverting gas into one of the two output ports. Additionally, there is a planar valve member pivotally connected at the junction of the inlet and two exhaust outlet. There is also means for pivotally moving the planar valve member from a first position to a second position to selectively block the flow of the gas out between the first or second exhaust output ports.

In still another aspect of this invention there is [provided] a device of the type for extinguishing fires[and], starting [back fires] backfires or a control burn. [The] This device comprises [an] engine and blower means. The engine [creates] ^{new} means operates the blower means to create an air stream[and an exhaust.] ._ An air output hose is [used] provided for directing the air stream at [a fire or back] the fire. At least one hose is provided for selectively diverting the exhaust into the air stream.

In still a further aspect of this invention there is provided a valve having an inlet port and two outlet ports. The valve comprises a shutter body [attached] and a pivot pin. The shutter body is secured to [a] the pivot pin. A valve rod is connected to and extending from[a

portion of] the pivot pin. A cable is attached to the valve rod [for moving] and moves the valve shutter body from a first position, blocking [the exhaust] one outlet port, to a second position[,]
unblocking the first outlet port and blocking the [exhaust bypass] second outlet port.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front view of the device;

FIG. 2 is a view of the left side of the device;

FIG. 3 is a view of the right side of the device;

FIG. 4 is a view of the Y-shaped valve;

FIG. 5 is a view of the Y-shaped valve with portions cut away to show operation of the valve; and

FIG. 6 is a view of the valve within the Y-shaped valve.

DETAILED DESCRIPTION OF THE INVENTION

The device is clearly depicted in FIG. 1. The device is a blower **10** having an engine **11** to create an airstream. The blower **10** is attached to a frame **12**, as is well known in the art. The blower **10** may have an air outlet hose **18**. The air outlet hose **18** allows the user to direct the generated airstream.

A Y-shaped valve **30** comprising an input leg **33** and first and second output exhaust legs **34** and **36**, respectively. Exhaust, created by the internal combustion of the engine **11**, may flow through an exhaust output pipe **31** which is connected to the input leg **33** of the Y-shaped valve **30**. The exhaust output pipe **31** connects to the exhaust input leg **33** (FIGS. 5 and 6) of a

Y-shaped valve 30 comprising an input leg 33, and a first and second output exhaust legs 34 and 36, respectively. A conduit 22 may be connected to a port (not shown) in the blower 10 approximately 180° before the outlet hose 18. Conduit 22 may be coupled by a T-connection 29 (FIGS. 1 and 2) to the engine exhaust pipe 31 (FIG. 4). The Y-shaped valve 30 receives the supply of air from the blower 10 from T couple 29. The air cools and speeds the flow of the exhaust gas as will be explained later.

The exhaust gas and air enters the Y-shaped valve 30 and may either exit the Y-shaped valve 30 through the first exhaust outlet leg 34 (FIGS. 5 and 6) to the atmosphere or may be diverted to the second output exhaust leg 36 of the Y-shaped valve 30 into the blower 10 where the air stream is about to exit outlet hose 18.

FIG. 2 shows the left side of the device. As may be seen in this view, the device has shoulder straps 14 attached to the frame 12 to allow the operator to carry the device on his back. The orientation and location of the Y-shaped valve 30 prevents the exhaust exiting either of the two exhaust legs 34 or 36 from interfering with the breathing of the operator and propels the carbon monoxide further away from the operator so that it is less likely that the operator will inhale this noxious gas. Additionally, the air mixture with the exhaust gas materially reduces the temperature of the exhaust thereby reducing heat buildup on metal parts. This, in turn, reduces the possibility that the operator's hands or body will be burned.

The right side of the device, as shown in FIG. 3, shows the air outlet 18 of the blower 10. The engine exhaust may be diverted by the Y-shaped valve 30 through the second

exhaust leg 36 which may be coupled to an exhaust delivery hose 52. The other end of the delivery hose 52 is connected to a port or opening 53 [into] in the housing of the blower 10 at a point just before the air outlet 18. In this way, exhaust gasses may be delivered into the airstream created by the blower 10 thereby increasing the flow of the output gases as well as adding such flame retarding exhaust constituents as carbon monoxide and carbon dioxide to the exhaust stream.

The diversion of the exhaust is more fully explained with reference to FIG. 4. The exhaust intake leg 31 of the Y-shaped valve 30 may be selectively connected to the first or second exhaust outlet leg 34 or 36, respectively. Attached to the second exhaust outlet leg 36 is, as previously discussed, the exhaust delivery hose 52. A control element such as a flapper valve or shuttle 62 pivotally secured by a pivot pin 64 or the like at the Y junction of the Y-shaped valve 30. The valve member 62 may be used to determine whether the exhaust and air combination passes to outlet hose 18 of blower 10 or passes [direct] directly through the first exhaust leg 34. [Alternatively, well known valve constructions may be used in place of the Y-shaped valve 30 (e.g., ball or slider valves).

A valve rod 72 may be connected, at one end, to a flexible valve actuating cable 45. Such cables are well known in the art. A bracket 42 may be secured to the second exhaust output leg 36. A cable guide 49, again, well known in the art, may be attached to the bracket 42 for receiving and supporting the cable 45. The cable 45 extends through the guide 49. The guide 49 insures smooth operation of the cable 45, as is well known in the art. Movement of the cable 45, in turn, moves the rod 72 to affect movement of the flapper valve 62.

The combination of the Y-shaped valve 30 with the flapper valve 62 is better seen with reference to FIGS. 5 and 6 which provide a sectional view of the Y-shaped valve 30 in the vicinity of the flapper valve 62. Thus, as previously indicated the Y-shaped valve 30 has therewithin a shutter valve body 62 connected to a pivot pin 64. The valve rod 72 is connected to the pivot pin 64. Movement of the rod 72 may be caused by actuation of the cable 45. The shutter 62 may be connected to the pivot pin 64 to move the shutter from a first position, shown in FIG. 5, to a second position, shown in phantom in FIG. 5 in the direction of the arrow 63. In the first position, the exhaust and air coming through exhaust intake leg 32 is diverted into the second exhaust leg 36. The exhaust delivery hose 52 then carries the mixture of exhaust and air from the second exhaust leg 36 to the juncture 53 with the blower 10 just before the air outlet hose 18. When the shutter valve 62 is moved to the second position (shown in phantom) the exhaust and air combination flows directly from the exhaust pipe 32 through the first exhaust outlet pipe 34.

In operation, the blower 10 generates a stream of air which exits blower port 18 at a substantially constant velocity. When the Y-valve 30 diverts the mixture of exhaust and air through conduit 52 and into the exit port 18, the resulting stream is increased in velocity. Further, the air propels the air-engine exhaust at greater velocity than if the exhaust alone were used.

The combined exhaust and air stream, exiting the blower port 18 at high speeds. This stream of air] can be used to blow out a fire when the air is directed at the source of the fire. When used to extinguish a fire, exhaust from the engine 11, mixed with air from the blower

10, is diverted through [a] the Y-shaped valve 30 into the blower [air stream] airstream just before the output port 18. This has a twofold affect: it increases the speed of the airstream and increases the amount of carbon monoxide and carbon dioxide in the airstream to help starve the fire of oxygen.

The [combined] device can also be used to start backfires. After the appropriate location of a [back fire] backfire has been selected, a fire is started. The airstream (without the addition of the exhaust) created by the [device] blower 10 can be used to both encourage the propagation of the fire and direct the fire towards the main wild fire. The ability to quickly spread the [back fire] backfire in the proper direction is imperative because a sudden change in wind direction or other weather conditions could cause the [back fire] backfire to become as big a problem as the original fire. In the same way, the blower 10 can be used to perform a control burn. A control burn is one in which a fire is intentionally maintained to clear a predetermined area.

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Yet another use for this device is contain small chemical or oil spills by using the blower 10 to divert the liquid to a safer area.

While the invention has been described with reference to a preferred embodiment, modifications and variations would be obvious to one of ordinary skill in the art without departing from the scope of the invention. The exact description of the invention is not intended to be limiting in any way but to cover these modifications and variations.



WHAT IS CLAIMED IS:

1. ^{new} A method of [extinguishing] controlling a fire, comprising the steps of
- a) providing an engine having an engine exhaust;
 - b) providing a blower, with an output port, connected to the engine
[for providing an output air stream;]
 - c) driving the blower [with the engine;
 - d) diverting engine exhaust into the air stream, and
 - e) directing] by the engine to provide an output stream of air through

the output port;

- d) removing at least part of the air stream from the blower[with the
output hose at the fire]; and
- e) directing the blower air stream to the fire by means of the output
port.

2. The method of Claim 1, further comprises providing the blower with a
blower housing, the step of [diverting] removing the [exhaust] air stream comprises [diverting]
removing the [exhaust into blower] air stream from the housing before the blower output [hose]
port.

3. The method of Claim [1] 2, further comprises providing a Y-shaped valve which has an input leg and two output legs and wherein the step of [diverting comprises directing the exhaust through] removing comprises mixing the part of air stream and the engine exhaust before the input port of the Y-shaped valve; and directing the mixed air stream and engine exhaust into the input port of the Y-shaped valve.

4. The method of Claim 1, further comprises providing valve means, and [the step of] diverting [includes directing] the part of the air stream and engine exhaust [flow with] by the valve means.

5. The method of Claim 4, wherein the step of diverting [further] comprises[providing means for] tapping into the blower [air stream] housing before the blower [exhaust] output port; the step of diverting the engine exhaust includes mixing the exhaust with the [tapped] part of the air stream and [moving] conveying the mixed [air] stream and engine exhaust through the valve means.

6. The method of Claim 5, wherein the step of diverting further comprises [either diverting] directing, by the valve means, the mixed air and engine exhaust by the valve means [so as to divert the air exhaust selectively] alternatively to the blower output port and

outwardly as an exhaust stream removed from the air stream being propelled from the blower output port.

new 7. The method of Claim 5, wherein the step of mixing reduces the exterior temperature of housing parts of the blower and of the engine making the device safer to use.

new 8. The method of Claim 5, wherein the step of mixing comprises increasing the velocity of the mixed air and engine exhaust to thereby propel unsafe exhaust gases away from the user.

9. The method of Claim 5, where in the step of directing the mixed air and engine exhaust to the blower output port comprises increasing the output velocity of the gas stream from the blower output port for more efficient operation.

[7.] 10. A method of [starting back fires of the type required where there is a pre-existing fire] providing a controlled or backfire, comprising the steps of

- a) starting a fire[.];
- b) providing a device capable of producing an air stream;
- c) producing the air stream[,] by means of the device;
- d) directing the air stream at the fire, and
- e) causing the fire to spread in a controlled manner.

[8] 11. The method of Claim [6] 10, wherein the step of causing the fire to spread in a controlled manner comprises directing the fire toward [the prior] an ongoing uncontrolled fire.

[9] 12. The method of claim [6] 10, further comprises providing an air output hose; directing the air stream with the air output hose.

[10] 13. The method of claim [8] 12, further comprises providing a blower driven by an engine and creating the air stream by the blower engine.

[11] 14. A [device for diverting gas] valve comprising[,]:

- a) an [exhaust inlet,] input port and at least two [exhaust outlets,] output ports;
- b) a planar valve member for selectively diverting [the] gas into [either the exhaust outlet or exhaust bypass; and
- c) the valve comprises a] one of said two output ports;
- c) said planar valve member pivotally connected at the junction of [the] said inlet and two exhaust outlet; and

d) means for pivotally moving said planar valve member from a first position to a second position to [alternatively] selectively block the flow of the gas [out of the] between said first or second exhaust [outlets] output ports.

[12] 15. The device of Claim [10] 14, further comprising a valve rod and a pivot pin; said valve rod is pivotally connected to said pivot pin, said valve rod extending from said pin for manipulating said valve.

[13] 16. The device of Claim [11] 15, further where in said valve member comprises a shutter body and the device further comprising a cable attached to said valve rod for moving said [valve] shutter body between said first and second positions.

[14] 17. The device of Claim [12] 16, wherein said [inlet] input port and exhaust [outlets comprise] output ports are joined by a substantially Y-shaped valve and said device further comprises guide means secured to said pipe for guiding said cable.

[15] 18. A device of the type for extinguishing fires[and], starting [back fires] backfires or a control burn, comprising:

a) [an] engine and blower means, said engine means operating said blower means to create an air stream[,];

b) an air output hose for directing said air stream at [a] the fire[or back fire,]; and

c) at least one hose for selectively diverting the exhaust into said air stream.

[16] 19. The device of claim [15] 18, further comprises a pipe; said hose comprises an exhaust delivery hose and [at] an exhaust output hose connected to said pipe, said exhaust delivery hoses connected to [the] said pipe and [the] said air blower means proximate said air output hose.

[17] 20. A device according to Claim [16] 19 wherein,
said pipe comprises an exhaust inlet, an exhaust outlet and an exhaust bypass, and
a valve for selectively diverting the exhaust into [one of the] said exhaust outlet or
exhaust bypass.

[18] 21. The device of Claim [17] 20, wherein said valve is located at the
junction of the exhaust outlet and the exhaust bypass.

[19] 22. The device of claim [18] 21, wherein said valve comprises a shutter
body pivotally attached to a pivot pin.

[20] 23. The device of claim [19] 22, further [comprising] comprises a valve rod secured to said pivot pin and extending without said pipe.

[21] 24. The pipe of claim [20] 23, further [comprising] comprises a cable attached to [the] said valve rod for moving said valve shutter body from a first position, blocking the exhaust outlet to a second position blocking the exhaust bypass.

[22] 25. The pipe of claim [23] 24, further [comprising] comprises a bracket attached to said pipe, [the] said bracket having a guide for [the] said cable.

[23] 26. The pipe of claim 24, wherein said bracket is attached to [the] said exhaust bypass.

[24] 27. A valve of the type having an inlet port and two outlet ports,
a) said valve comprises a shutter body and a pivot pin, said shutter body being secured to said pivot pin,
b) a valve rod connected to and extending from said pivot pin, and
c) a cable attached to said valve rod for moving said valve shutter body from a first position, blocking one outlet port, to a second position unblocking the first outlet port and blocking the second outlet port.

ABSTRACT

The invention employs a blower of the type used by commercial landscapers. The device has an engine mounted on a frame. Shoulder straps attached to the frame allow the user to wear the device on his back leaving the hands of the operator free to operate other tools such as a chain saw or perform other tasks. Also, wearing the device on the back makes it easier to transport the device over long distances to the source of the fire or [back fire] backfire to be started. The device's blower generates a stream of air at high speeds. This stream of air can be used to feed a fire when the air is directed at a fire. When used to extinguish a fire, air from the blower is tapped from a point 180 degrees removed from the blower output and mixed with exhaust from the engine. This mixture is diverted through a Y-shaped valve into the airstream coming out of the blower. When the device is used to start [back fires] backfires a fire is started. The airstream, without the mixture of air and engine exhaust can be used to both encourage the propagation of the fire and direct the fire towards the main wild fire. The ability to quickly spread the [back fire] backfire in the proper direction is imperative because a sudden change in wind direction or other weather conditions could cause the [back fire] backfire to become as big a problem as the original fire.